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USER'S GUIDE TO THE TIME SERIES EDITOR.(U)
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USER'S GUIDE TO THE TIME SERIES EDITOR

by

F. Russell Richards
and
Stephen R. Woodall

November 1978

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NAVAL POSTGRADUATE SCHOOL
MONTEREY, CALIFORNIA

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This report provides a user's guide to the Time Series Editor, an interactive software package for time series analysis. Data input requirements are explained; the capabilities of the software package are explained; and output options are described. A sample user session is given with actual input and output provided. Error correction and recovery techniques are described. This guide is included in AD-A064 901 as Appendix A.

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by

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ABSTRACT

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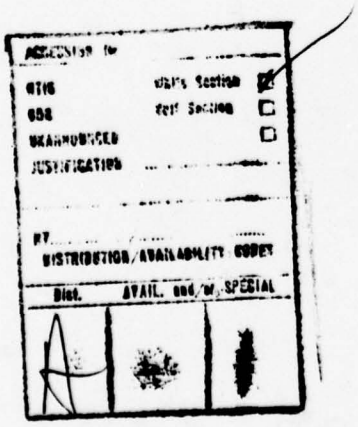


0. INTRODUCTION

The Time Series Editor is a collection of FORTRAN programs controlled by a master program called TIMESER EXEC in the CP/CMS executive language. The package has been designed for the analysis and forecasting of time series data using the Box-Jenkins modelling methodology. For a complete description of the Time Series Editor, see Richards and Woodall [Ref. 16]. This Guide contains the minimum information that is required for the user to access the Time Series Editor, enter data, build a model, evaluate the model, forecast, and obtain output.

I. DATA INPUT

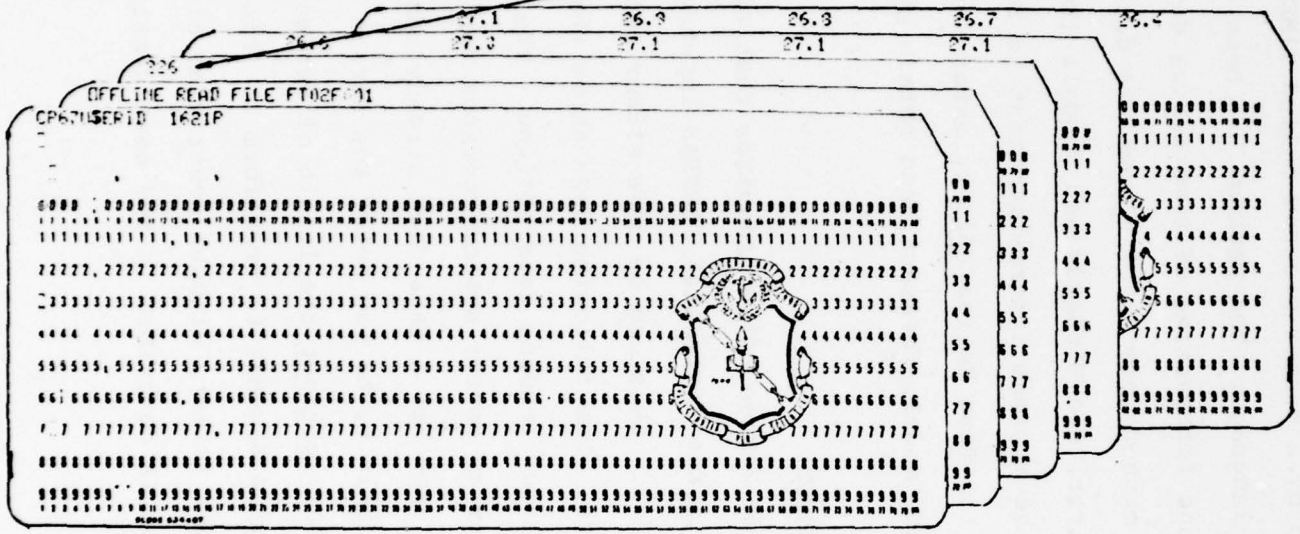
The Time Series Editor requires that time series data be entered into the sequential FORTRAN input/output file named FILE FT02F001. This can be done either online or via cards read offline. The following page shows the proper card deck arrangement for reading data offline. The data deck must be given to the computer center system operator for entry into CP.

If the user has a data deck already punched up in a format other than 5F15.6, he may enter the series as above into FILE FT03F001 (without the length of series card) and use the Editor program ZFORMAT to transform it into the FILE FT02F001 in the proper format, without destroying his original file. This program is described in the next section.

DATA ENTRY DECK

time saver data deck
in FORMAT (5F15.6)

length of series in
FORMAT (I3)
(omit for ZFORMAT
program)



II. TABLE OF OPTIONS

This Table provides the user with the basic information necessary to understand the data requirements, functions and output options for each program in the Editor.

PROGRAM	INPUT	OUTPUT	REMARKS
Name: ZFORMAT Entry Code: z	Files: (1) data in FILE FT03F001 Keyboard: (1) length of time series (2) format of time series	Files: (1) original data put in FORMAT(5F15.6) in FILE FT02F001 (2) original data unchanged in FILE FT03F001	(1) puts date into proper format for Time Series Editor (2) single precision
Name: CMSWORK Entry Code: C	no specific input; normal usage would include file name alteration, obtaining disc status, or erasing files no longer required	no specific output	(1) allows users to perform CMS admin actions while in TIMESER environment
Name: TRANS Entry Code: T	Files: (1) data in FILE FT02F001 Keyboard: (1) origin translation? (2) scale change factor? (3) log transform? (4) power/root transform?	Files: (1) original data unchanged in DATA FT02F001 (2) transformed data in FILE FT02F001 (3) transformation parameters in FILE FT07F001	(1) allows user to transform data in a file (2) single precision

PROGRAM	INPUT	OUTPUT	REMARKS
Name: DIFF Entry Code: D	Files: (1) original (transformed if desired) series in FILE FT02F001 Keyboard: (1) series seasonal? (2) number of non-seasonal differences (3) number of seasonal differences (4) length of seasonal period	Files: (1) original series unchanged in FILE FT02F001 (2) differenced series in FILE FT03F001	(1) allows user to perform differencing of a time series, in order to achieve series stationarity (2) uses IMSL subroutine FTRDIF (3) single precision
Name: PLOT Entry Code: P	Files: (1) original series in FILE FT02F001 Keyboard: (1) title for	Files: (1) original series unchanged in FILE FT02F001 Offline: (1) plot of time series	(1) allows user to plot any time series using offline printer (2) uses SSPLIB routine PLOT8 (3) single precision

PROGRAM	INPUT	OUTPUT	REMARKS
Name: AUTO Entry Code: A	Files: (1) original series in FILE FT02F001 transformed and/ or differenced if desired Keyboard: (1) number of autos/ pautos to be calculated (2) title for plots of autos/pautos	Files: (1) original series unchanged in FILE FT02F001 (2) plots of autos/ pautos in FILE FT08F001 Terminal: (1) values of autos and pautos (2) mean (3) variance Offline: (1) plots of autos and pautos	(1) allows user to obtain basic statistics for time series (2) uses IMSL subroutine FTAUTO, as well as UTPLT8 routine (3) single precision
Name: ESTIMATE Entry Code: E	Files: (1) original series in FILE FT02F001; transformed and/ or differenced as desired. Keyboard: (1) number of AR parameters (2) number of MA parameters (3) number of (non-seasonal) differences to be taken, if series not already differenced (4) titles for plots of residual autos and pautos	Files: (1) original series unchanged in FILE FT02F001 (2) model residuals in FILE FT02F001 Terminal: (1) estimated AR parameters (2) estimated MA parameters (3) MA constant (4) residual variance (5) portmanteau test of residuals Offline: (1) plots of residual autos and pautos	(1) allows user to obtain maximum likelihood parameter estimates for a general non-seasonal ARIMA model, as well as data concerning model sufficiency (2) uses IMSL subroutine FTMAXL (3) single precision

PROGRAM	INPUT	OUTPUT	REMARKS
Name: YESTSEAS Entry Code: Y	Files: (1) original series in FILE FT02F001 transformed if desired; and either differenced or undifferenced Keyboard: (1) number of seasonal and non-seasonal differences to be taken (2) length of seasonal period (3) numbers of both seasonal and non-seasonal AR and MA parameters	Files: (1) original series unchanged in FILE FT02F001 Terminal: (1) estimated values for requested seasonal and non-seasonal AR and MA parameters	(1) allows user to calculate initial non-seasonal and seasonal ARIMA model parameter estimates as input to WMARQRDT routine (2) uses IMSL subroutines FTRDIF, FTMAXL, FTAUTO, FTARPS and FTMAPS (3) single precision
Name: WMARQRDT Entry Code: W	Files: (1) original series in FILE FT02F001; may be transformed but not differenced (either diff or nondiff) Keyboard: (1) number of seasonal and non-seasonal differences to be taken (2) length of seasonal period	Files: (1) original series unchanged in FILE FT02F001 Terminal: (1) seasonal and non-seasonal AR and MA parameter estimates (2) parameter standard errors (3) MA constant term (4) sum of squared residuals (5) residual variance	(1) allows user to estimate non-linear least squares parameters for a general seasonal Box-Jenkins ARIMA model (2) requires initial parameter estimates, obtainable using YESTSEAS program (3) uses IMSL subroutines FTRDIF, FTAUTO, LINV1F, and MDCDFI, SSPLIB routine DPLOTP, and Time Series Editor resident subroutine PARSH, MARQRT, SUMSQ, SWAPB and FORMB

PROGRAM	INPUT	OUTPUT	REMARKS
Name: WMARQRDT (CONTINUED)	(3) number and initial estimates of seasonal and non-seasonal AR and MA parameters	(6) residual variance (7) portmanteau test for model goodness-of-fit Offline: (1) plots of autos/pautos of residuals	(4) double precision (5) requires LOGIN with 450k core (6) if non-seasonal modeling, input length of season = 1
Name: XSUMSQ Entry Code: X	Files: (1) original series in FILE FT02F001; should be transformed and/or differenced as desired Keyboard: (1) number and estimates of seasonal and non-seasonal AR and MA parameters (2) length of seasonal period	Files: (1) original series unchanged in FILE FT02F001 Terminal: (1) value of residual sum of squares for the model and parameters specified	(1) allows user to obtain a residual sum of squares value for any seasonal or non-seasonal ARIMA model with specified parameters (2) uses Time Series Editor resident subroutine SUMSQ (3) double precision
Name: FORECAST Entry Code: F	Files: (1) original series in FILE FT02F001; transformed as desired, but not differenced Keyboard: (1) number of seasonal and non-seasonal differences to be taken	Files: (1) original series unchanged in FILE FT02F001 (2) forecast values and plot FILE FT08F001	(1) allows the user to forecast any seasonal or non-seasonal time series using a previously determined seasonal or non-seasonal ARIMA model and the time series itself

PROGRAM	INPUT	OUTPUT	REMARKS
Name: FORECAST (CONTINUED)	(2) length of seasonal period (3) number and estimated values of seasonal and non-seasonal AR and MA parameters (4) MA constant (5) index for forecast origin (6) maximum forecast lead time (7) index for plot origin (8) confidence level for forecast confidence units	Offline: (1) plot of forecast of series, including listing of forecast values and confidence interval values	(2) uses IMSL subroutine FTRDIF and modified SSPLTB routine UTPLOT called UTPLT8 (3) single precision
Name: ROOTS Entry Code: R	Keyboard: (1) number of AR parameters in undifferenced form (2) values of AR parameters	Terminal: (1) values of roots	(1) allows user to calculate the roots of the characteristic equation for non-seasonal ARIMA models (2) uses IMSL routine ZPOLR (3) single precision
Name: HELP Entry Code: H	None	None	(1) allows user to access program information paragraphs after the TIMESER introduction phase has been completed

PROGRAM	INPUT	OUTPUT	REMARKS
Name: GENERATE Entry Code: G	Keyboard: (1) random number seed (2) number and values for non-seasonal AR and MA ARIMA model parameters (3) MA constant term (4) residual variance (5) length of series to be generated (6) initial starting value for time series to be generated	Files: (1) generated time series written onto FILE FT02F001 Offline: (1) length of generated series and series values themselves are printed offline	(1) allows the user to generate a time series from a given non-seasonal ARIMA model, previously determined (2) uses IMSL subroutine FTGEN1 (3) single precision
Name: SIMULATE Entry Code: S	Files: (1) original series in FILE FT02F001, transformed and/or differenced as desired Keyboard: (1) number and values for non-seasonal AR and MA ARIMA model parameters (2) MA constant term (3) residual variance (4) index value of time series where simulation is to begin (5) starting values of series to be simulated (6) random number seed (7) number of values to be simulated in each series (8) number of series to be generated	Files: (1) original series unchanged in FILE FT02F001 Terminal: (1) Simulated series	(1) allows user to produce any number of simulated time series from a given non-seasonal ARIMA model (2) uses IMSL subroutine FTGEN1 (3) single precision

III. THE BASIC USER SESSION

To use the Time Series Editor, the user must log into CMS, get into CP, link to the disc storage area where the Time Series Editor resides, reimplement CMS, log into the general user and Time Series Editor disc areas, and enter the TIMESER routine. This section will provide explicit guidelines to enable the user to perform the above steps on the NPS CP/CMS system. Commands marked with an asterisk (*) are those actually entered on the terminal by the user (the asterisk itself is omitted). Those without an asterisk and those written in all capital letters are system responses at the terminal. Numbered sentences are comments, which will not appear during an actual user session. The instructions and system responses assure the user is on an IBM 2741 Input/Output Terminal. Some minor modifications may be necessary if other terminals are used.

1. Turn the terminal on, depress the BREAK key, and wait for the system to respond:

   CP-67 online xd.65 gsyosu

2. Depress the ATTN key. The roll bar will advance and the keyboard will unlock. Then enter:

   *login aaaapbb 450k

3. aaaa is the user's identification number, and nn is the terminal number (usually written on the terminal). For example, if the user's ID number is 1621 and the terminal number is 44, the input would be: login 1621p44 450k. The addition of 450 k to the normal login command is necessary to execute the program WMARQRDT in the Editor; for users not planning to execute this program during a session, this addition is not necessary.

4. The system will respond with the statement:

   ENTER PASSWORD:

5. The user then enters his password, or the general users password npg;

   *password

6. The system will then respond:

   ENTER 4-DIGIT PROJECT NUMBER FOLLOWED BY 4-CHARACTER COST CENTER CODE:

7. The user then enters:

   *ggggghhhh

8. gggg is the assigned project number, and hhhh is the user's section designator or the faculty code.

9. The system will respond with the message of the day, such as:

   CP/CMS HOURS ... 0930=2200(MON-THURS) ... 0930-1800(FRI)
   OUTPUT RETAINED 5 DAYS
   Cms Version 3.25

10. At this point, the user is in CMS. He must then get into CP; this can be done by hitting the ATTN key. The system will then respond:

    CP

11. The user must then link to the TIME SERIES EDITOR; this is accomplished by entering:

    *link 2069p 191 192

12. The system will respond with:

    ENTER PASSWORD:

13. The password (read only) to enter the Editor is:

    *timser

14. The system then responds:

    SET TO READ ONLY

15. The user now implements CMS by:

    *ipl cms

16. The system will respond:

    CMS Version 3.25

17. Now the user must log into both the general user and the Time Series Editor area by entering:

    *login 191

18. The system will respond with a message such as:

    R;

19. The user then enters the command:

    *login 192 t,p

20. The system will respond:

    T (192) R/O
    R;

21. The user can then enter the Time Series Editor (guided version) by entering the command:

    *timeser

22. The system will respond:

    EACH 2 SECONDS EXECUTION TIME IS INDICATED BY *

    YOU HAVE ENTERED THE TIME SERIES EDITOR

    PLEASE RESPOND TO EACH QUERY WITH AN INPUT AT THE TERMINAL.
    ENTER ONLY THE FIRST LETTER FOR A WORD RESPONSE.
    ENTER NUMERICAL VALUES VIA FORTRAN FORMAT.

    TYPE INTEGER VALUES (RIGHT JUSTIFIED) FOR NAMES STARTING WITH I THROUGH N. TYPE FLOATING VALUES WITH DECIMAL FOR ALL OTHERS.

    DO YOU WANT A LIST OF THE OPTIONS?

23. The user is then on his own, guided by the Exec routine. See the notes that appear at the end of this guide for additional information. Eventually the user will be asked:

    DO YOU WANT TO TRY AGAIN?

24. If a yes response is given, another sequence will begin; if the response is no, the user will be taken out of the Time Series Editor environment and returned to CMS. The system response will be:

```
CONTROL RETURNED TO CMS
R;
```

25. The user can then log out of CMS by typing:

```
*cp logout
```

26. The system will respond with:

```
CONNECT= 00:08:02  VIRTCPU= 000:07.98  TOTCPU= 000.10.94
LOGOUT AT 14.22.04 on 10/16/78
```

27. The user should then turn off his terminal and tear off the output from his session.

The more experienced user can dispense with the "welcome aboard" section of the Time Series Editor and get right down to business by using the shortened version of the Editor. This shortened version may be entered by linking in the normal way, and then entering the Editor by typing the COMMAND

```
*timeser s        (asterisk omitted).
```

The system will immediately respond:

```
ENTER LETTER FOR OPTION YOU WANT.
```

The session inside the Editor then begins.

IV. BRIEF SAMPLE USER SESSION

A brief sample user session is given below; it includes copies of the offline output generated during the session.

```
repeat login  nur@pn@

login 1621p44 450k
ENTER PASSWORD:

ENTER 4-DIGIT, PROJECT NUMBER FOLLOWED BY 4-CHARACTER COST CENTER CODE:
0444r172
READY AT 17.24.38 ON 09/16/78
CMS Version 3.25

stat
P (191): 29 FILES; 241 REC IN USE, 55 LEFT (of 296), 81% FULL (2 CYL)
R;
cp q f
FILES:- NO RDR, NO PRT, NO PUN
R;
CP
link 2069p 191 192
ENTER PASSWORD:

SET TO READ ONLY

ipl cms
CMS Version 3.25

login 191
R;
login 192 t,p
T (192) R/O
R;

timeser
EACH 2 SECONDS EXECUTION TIME IS INDICATED BY *.

YOU HAVE ENTERED THE TIME SERIES EDITOR.

PLEASE RESPOND TO EACH QUERY WITH AN INPUT AT THE TERMINAL.
ENTER ONLY THE FIRST LETTER FOR A WORD RESPONSE.
ENTER NUMERICAL VALUES VIA FORTRAN FORMAT.

TYPE INTEGER VALUES (RIGHT JUSTIFIED) FOR NAMES STARTING
WITH I THRU N. TYPE FLOATING VALUES WITH DECIMAL FOR ALL OTHERS.

DO YOU WANT A LIST OF THE OPTIONS?
y


OPTION                          DESCRIPTION
GENERATE -----GENERATE ANY ARIMA TIME SERIES
AUTO ---------CALCULATE AUTOCORRELATIONS, PAUTOS, MEAN AND VARIANCE
PLOT ---------PLOT A TIME SERIES
ESTIMATE -----CALCULATE MAX LIKELIHOOD ESTIMATES OF ARMA PARAMETERS
DIFF ---------DIFFERENCE A TIME SERIES
FORECAST -----FORECAST FUTURE VALUES, CONSTRUCT CONFIDENCE INTERVALS
TRANS --------TRANSFORMS VALUES OF A TIME SERIES
ROOTS --------DETERMINES ROOTS OF ARIMA CHARACTERISTIC EQUATION
ZFORMAT ------ALTER DATA FILE TO FORMAT 5F15.6
CMSWORK ------PERFORM CP/CMS COMMANDS IN TIMESER EXEC
SIMULATE -----SIMULATE NONSEASONAL TIME SERIES
YESTSEAS -----CALCULATE INITIAL SEASONAL PARAMETERS
XMARQRDT -----MARQUARDT SOLUTION FOR PARAMETER ESTIMATES
XSUMSQ -------CALCULATE SUM OF SQUARES FOR ARBITRARY PARAMETERS


WOULD YOU LIKE MORE INFO?
y
```

```
ENTER OPTION YOU WANT INFO ABOUT.
a

AUTO --------THIS PROGRAM CALCULATES AUTOCORRELATIONS, PARTIAL
AUTOCORRELATIONS, THE MEAN AND THE VARIANCE FOR A GIVEN TIME SERIES
WHICH MUST RESIDE IN FILE FT02F001.  THE PROGRAM USES
FTAUTO IN THE IMSL LIBRARY.  THE AUTOCORRELATIONS AND PAUTOS CAN BE
PLOTTED OFFLINE.


DO YOU WANT INFO ABOUT ANOTHER OPTION?
n
DO YOU WANT TO TRY A SESSION?
y

ENTER LETTER FOR OPTION YOU WANT.
c
ENTER DESIRED CP/CMS COMMANDS, ONE PER LINE.
WHEN FINISHED TYPE: &GOTO -QUES
listf * ft02f001
FILENAME FILETYPE MODE NO.REC. DATE
SERG     FT02F001  P1       3    9/16
SERC     FT02F001  P1       5    9/16
LNSERG   FT02F001  P1       3    9/16
FILE     FT02F001  P1       1    9/16
erase file ft02f001
alter serc ft02f001 p1 file ft02f001 p1
stat
P (191): 28 FILES; 240 REC IN USE, 56 LEFT (of 296), 81% FULL (2 CYL)
&goto -ques
DO YOU WANT TO GO AGAIN?
y

ENTER LETTER FOR OPTION YOU WANT.
a
IS YOUR DATA IN FILE FT02F001?
y
EXECUTION BEGINS...
              AUTOCORRELATIONS

 0.978  0.944  0.902  0.854  0.802  0.748  0.692  0.635  0.579  0.923
 0.468  0.413  0.359  0.305  0.253  0.201  0.150  0.098  0.047 -0.003
-0.052 -0.101 -0.151 -0.200 -0.248


         PARTIAL AUTOCORRELATIONS

 0.978 -0.260 -0.157 -0.093 -0.058 -0.045 -0.012 -0.038 -0.022 -0.010
-0.036 -0.041 -0.038 -0.024 -0.037 -0.027 -0.032 -0.070 -0.048 -0.024
-0.034 -0.061 -0.079 -0.048 -0.037


    MEAN= 22.9739          VARIANCE =  4.22273

 ENTER TITLE FOR PLOTS.
autos and pautos for series c data
 YOUR AUTO AND PAUTO PLOTS HAVE BEEN PRINTED OFFLINE.
 PICK UP IN ROOM 1140 UNDER YOUR USER ID NUMBER.
DO YOU WANT TO GO AGAIN?
y

ENTER LETTER FOR OPTION YOU WANT.
c
ENTER DESIRED CP/CMS COMMANDS, ONE PER LINE.
WHEN FINISHED TYPE: &GOTO -QUES
offline print file ft02f001
alter file ft02f001 p1 serc ft02f001 p1
&goto -ques
DO YOU WANT TO GO AGAIN?
n
CONTROL RETURNED TO CMS
R;
```

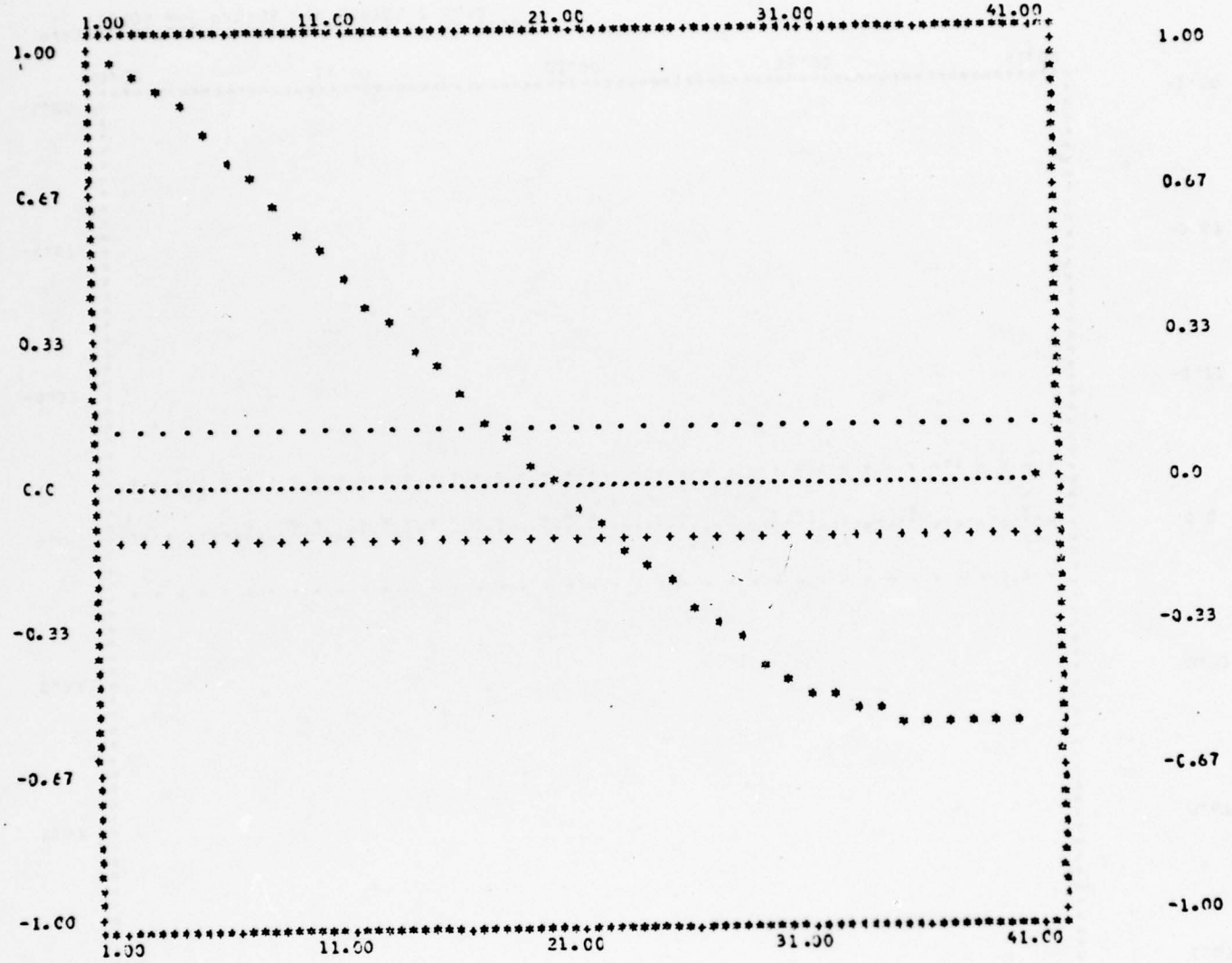
AUTOCORRELATIONS

0.978	0.944	0.902	0.854	0.802	0.748	0.692	0.635	0.579	0.523
0.468	0.413	0.359	0.305	0.253	0.201	0.150	0.098	0.047	-0.003
-0.052	-0.101	-0.151	-0.200	-0.248	-0.294	-0.337	-0.379	-0.418	-0.454
-0.486	-0.512	-0.534	-0.550	-0.562	-0.570	-0.573	-0.573	-0.568	-0.562

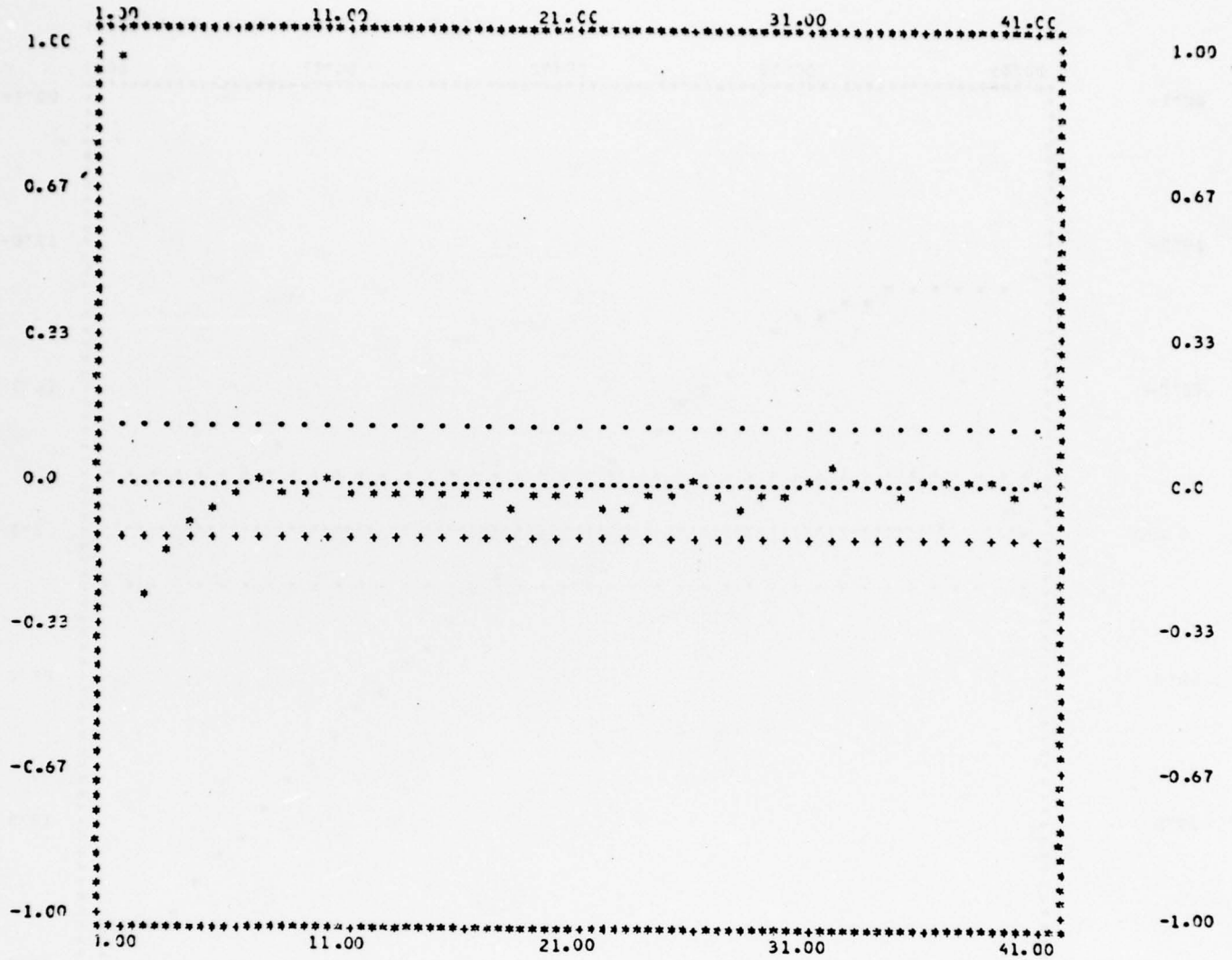
PARTIAL AUTOCORRELATIONS

0.978	-0.260	-0.157	-0.093	-0.058	-0.045	-0.012	-0.038	-0.022	-0.010
-0.036	-0.041	-0.038	-0.024	-0.037	-0.027	-0.032	-0.070	-0.048	-0.024
-0.034	-0.061	-0.079	-0.048	-0.037	-0.011	-0.031	-0.054	-0.036	-0.024
-0.002	0.022	-0.014	-0.006	-0.024	0.006	-0.016	-0.004	-0.010	-0.036

MEAN= 22.9739 VARIANCE = 4.22273



AUTOCORRELATIONS WITH 2 SIGMA BANDS.



PARTIAL AUTOCORRELATIONS WITH 2 SIGMA BANDS.
ALTOS AND PAUTOS FOR SERIES C DATA

09/16/78 17.46.25

FILE: SERC FT02F001 P1

226

		N	P	S
26.6	27.0	27.1	27.1	27.1
27.1	26.9	26.8	26.7	26.4
26.0	25.8	25.6	25.2	25.0
24.6	24.2	24.0	23.7	23.4
23.1	22.9	22.8	22.7	22.6
22.4	22.2	22.0	21.8	21.4
20.9	20.3	19.7	19.4	19.2
19.2	19.1	19.0	18.9	18.9
19.2	19.3	19.3	19.4	19.5
19.6	19.6	19.6	19.6	19.6
19.7	19.9	20.0	20.1	20.2
20.3	20.6	21.6	21.9	21.7
21.3	21.2	21.4	21.7	22.2
23.0	23.8	24.6	25.1	25.6
25.8	26.1	26.3	26.3	26.2
26.0	25.8	25.6	25.4	25.2
24.9	24.7	24.5	24.4	24.4
24.4	24.4	24.4	24.3	24.4
24.4	24.4	24.4	24.4	24.5
24.5	24.4	24.3	24.2	24.2
24.2	23.9	23.7	23.6	23.5
23.6	23.6	23.5	23.5	23.7
23.8	23.8	23.9	23.9	23.8
23.7	23.6	23.4	23.2	23.0
22.9	22.6	22.4	22.0	21.8
21.3	21.2	21.2	21.1	21.0
20.9	21.0	21.0	21.1	21.2
21.1	20.9	20.8	20.8	20.8
20.8	20.9	20.8	20.8	20.7
20.7	20.8	20.9	21.2	21.4
21.7	21.8	21.9	22.2	22.5
22.8	23.1	23.4	23.8	24.1
24.6	24.9	24.9	25.1	25.0
25.0	25.0	25.0	24.9	24.8
24.7	24.6	24.5	24.5	24.5
24.5	24.5	24.5	24.5	24.4
24.4	24.2	24.2	24.1	24.1
24.0	24.0	24.0	23.9	23.9
23.8	23.7	23.7	23.6	23.5
23.6	23.6	23.6	23.5	23.5
23.4	23.3	23.3	23.3	23.4
23.4	23.3	23.2	23.3	23.3
23.2	23.1	22.9	22.8	22.6
22.4	22.2	21.8	21.3	20.8
20.2	19.7	19.3	19.1	19.0
18.8				

V. PROBLEM CONTROL NOTES

This section will cover corrective measures that can be taken when things fail to go as expected while in the TIMESER environment.

a. A typing error in the CMS environment can be corrected by typing the @ character as many times as is required to back up and then type the correct values. For example, if the user typed timesre, the user could correct the mistake by typing two @ signs, followed by the correct spelling er, as follows: timesre@@re. An entire line can be deleted by typing the ¢ character (or [on some terminals).

b. When working with TIMESER executive programs, the user should exercise care before hitting the return key (or control s on some terminals). If an input value is required and the return key is hit before the proper response is entered, the user will be likely to get thrown out of the editor and have to begin again. In most cases, errors can be corrected only before the return key is struck (in some programs you get a second chance for input).

c. Particular care should be taken for integer value input, which must be right justified in the format field. The editor will advise the user in all cases where the integer format is other than I1.

d. If for any reason the user finds himself in a debug or error condition (caused by erroneous data, or a "blowup" in one of the non-linear optimization routines usually

caused by very poor initial input values), the following procedure will get the user back into the normal TIMESER environment:

(1) depress the ATTN key twice; this gets the user into CP; hit the ATTN key again, and then type kx to kill the execution.
(2) re-ipl CMS, and login 191 and then login 192 t,p.
(3) then the user can type TIMESER or TIMESER S, and return to the TIMESER environment

On the next page is a sample user session where an error causing a debug condition has occurred.

Here the user executed a program that required data in FILE FT02F001, and the FILE did not exist. As the example shows, recovery is quick. Simply hit the break button to get into CP, login 191, login 192 t,p, and then type timeser s to return immediately to the Editor environment.

```
ENTER LETTER FOR OPTION YOU WANT.
d
EXECUTION BEGINS...

IHC218I FIOCS - I/O ERROR  BSAM INPUT  ERROR 01 ON FILE: "FT02F001"

   8

TRACEBACK  ROUTINE  CALLED FROM ISN   REG.  14   REG.  15   REG.   0   REG.   1

           IBCOM                      000131FC   000133F8   FFF93908   00014F80

           DIFF              CP
ipl cms
CMS Version 3.25

login 191
R;
login 192 t,p
T (192) R/O
R;

timeser s

ENTER LETTER FOR OPTION YOU WANT.
c
ENTER DESIRED CP/CMS COMMANDS, ONE PER LINE.
WHEN FINISHED TYPE: &GOTO -QUES
alter serc ft02f001 pl file ft02f001 pl
&goto -ques
DO YOU WANT TO GO AGAIN?
y

ENTER LETTER FOR OPTION YOU WANT.
d
```

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